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PHYSICS

THE NYU OMNIFAX

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Index

Abstract

All the frequently used service routines for the NYU Univac computer have been incorporated into one general routine called Omnifax. This routine contains all the options from its predecessor, the Omnibus routine, and has been expanded to include many new services.

A description of the options of Omnifax is given, together with operating instructions for the routine.

Section 1. Introduction

The "N. Y. U. Omnifax" incorporates all frequently used service routines. The various functions which it can perform are given below. Each option is requested by a twelve character Univac word specifying which function is to be carried out, (e.g. tape correction).

The control words are either typed in at the supervisory control console or typed on a tape called a control tape. These words specify to Omnifax which of the functions to perform and how to perform them. Each digit in a control word is used to indicate a particular method or result, (e.g. output tape to be written on at 20 pulses/ in. or input tape to be rewound).

The following are the functions of "Omnifax":

Copy from one tape to another correcting (if necessary) particular words.

Skip forward or backward on any tapes.

Compare two tapes in a forward or backward direction.

Proofread (Compare two tapes and produce a third tape eliminating errors).

Sample a tape (Type out on S.C.Typewriter or on tape requested groups of words in successive blocks on a tape).

Rewind any tapes.

Initial read and memory clear (any block of any tape will be read into any (mod 10) memory location).

Word search (type out the block and word of all locations on a tape containing identically a specified word).

Line search (type out the contents of specified block and word locations).

Codedit [regular, subroutine, or parallel (absolute-relative) editing].

Analyze tapes.

Ignore Squeeze (remove ignores from a tape of edited material).

This report contains detailed descriptions of the structure of the control words and the functions they perform. Methods of operations are described in the section on general operating instructions, which includes a discussion of the breakpoint options, the control tape, and other special operating characteristics.

Some changes have been made in the N.Y.U. Univac. The changes used in Omnifax are:

I (m) instruction - puts the contents of register L into memory location (m); rL remains unchanged.

70 (m) instruction - types out on SCT the contents of memory location (m) even if the output breakpoint switch is on skip or output breakpoint.

The input register (rI) clears before new information is read into it. It is not cleared when information is read out of it.

Servo space (Δ) When a servo order with a space in the second digit is used, the servo which obeys the order is the one whose number corresponds to the number of the initial tape selector button depressed.

The N.Y.U. shift instruction (÷n0000) is not used in Omnifax.

Each of the functions of Omnifax is completely specified by a single control word which is either typed in on supervisory control console or placed on a control tape. Thus operator control is reduced to a minimum.

The author wishes to acknowledge the help of K. Grossman and A. Paster in programming Omnifax and in preparing this report and thanks the programming staff for many valuable suggestions.

Section 2. General Operating Instructions

1. Omnifax tape is initial read from servo (△).
(note: Be sure the proper initial tape selector button is depressed.)

2. Unless transfer is forced on a breakpoint for control tape, a control word is requested.

3. The control tape is selected by forcing transfer on the breakpoint corresponding to the servo number on which it is placed.

4. The control word structure is discussed in full on pages 14 to 49.

5. Ordinarily a new control word is called for at the completion of the operation specified, but clearing C at any time will also call for a control word.

The use of breakpoints and further general operating instructions are discussed on the following pages.

Breakpoints

General Breakpoints (for control tape)

Control tape breakpoints (- through 9)

1. Before starting Omnifax or after clearing C, depress the breakpoint corresponding to the number of the servo on which the control tape is mounted.
2. Force transfer to get control words off tape.
3. Hit start bar to type control words in on supervisory control console.

Breakpoint 5 (Control word change)

1. Depress after releasing control tape breakpoint.
2. Force transfer to change a control word just typed out. (This option is used if the control words are taken off tape.)
3. Type in new control word to be processed.

Breakpoint 6 (New location on control tape)

1. Depress after finishing with control tape breakpoint.
2. Force transfer either to restart at some previous control word or to bypass control words.
   a. Control tape will rewind.
   b. Supervisory control typewriter will print out CTRL BLK WD.
   c. Type in location (000BBB0000WW) on control tape of control word desired.
   d. The routine will select the proper control word and continue on from there.

Breakpoint 0 (Previous location on control tape)

1. Depress after clearing C.
2. Force transfer to return to previous position on the control tape.

Note: If a control tape is being used and control words must be inserted, clearing C will call for control words to be typed in on supervisory con-

trol panel. To return to previous position on the control tape, force transfer on breakpoint 0.

"X" Order Breakpoints (Copy with corrections)

Breakpoint 7 (Insertions after CHECK ORDER while using control tape)

1. Depress after CHECK ORDER type-out indicating wrong BLK AND WD control on tape.
2. Force transfer after first correction type-in has been made if more correction words are needed.
3. Type in ENDINSERTION to return to place on control tape. (At the word following the one that caused the CHECK ORDER type-out.)

"E X" Order Breakpoints (Edit routines)

Breakpoint 2 (Sixty lines per page)

1. Depress before typing in first edit control word.
2. Force transfer if edit is wanted at 60 lines per page. (Otherwise material is edited at 30 lines per page.)
3. Breakpoint 2 is met only once and is not used again until the edit is completed with a "Z" order. (See detailed description of edit, pages 25-34).

Breakpoint 4 (Remove pages of zeros)

1. Depress before typing in the edit control word.
2. Force transfer after each control word type-in.
3. The edit will remove pages of zeros. The page counter is kept as if the pages were still in, so that the output will have appropriate gaps in the page numbering.

"IX" Order Breakpoint (Ignore squeeze routine)

Breakpoint 1 (End squeeze)

If the sentinel is missing and the tape does not have the specified number of blocks on it, then the tape must eventually run away or produce a bad read. When it has been determined that there can be no more input:

1. Depress breakpoint 1.
2. Skip the "30" order on supervisory control.
3. The machine will stop on a Q 1 order.
4. Force transfer to finish routine.

Control Section

Functions

1. Keeps track of control words.
2. Decides if information is coming off tape or is typed in.
3. Holds the place on control tape while type-ins are being made.
4. Calls correct memory loads into the memory if they are not there already.

Description

1. Length: 100 words long
2. Position: Stays in the memory at all time (000-099)
3. Control words stored in (940-999)

Breakpoints (see section on breakpoints, page 7, for details)

1. Control tape breakpoints (0 through 9)
2. Breakpoint 5 (Change control word)
3. Breakpoint 6 (New location on control tape)
4. Breakpoint 0 (Previous location on control tape)

The control section performs such functions as rewinding tapes, initial reading a tape, stop orders, and skip orders.

Control Tape

General Description

When a large amount of tape servicing is required the entire process can be planned off the machine, and a control tape typed. Once on the machine, the required sequence will then be carried through automatically and efficiently.

Method of Operation

1. Order of typing
   a. The control tape is typed up as if the orders were being typed in on supervisory control console.
   b. At the end of one block of control words the next block is automatically read into the memory.
2. Breakpoints (See section on breakpoints, page 7.)
   a. Control tape breakpoints (- through 9)
   b. Breakpoint 5 (Control word change)
   c. Breakpoint 6 (New location on control tape)
   d. Breakpoint 0 (Previous location on control tape)
3. Processing
   After the control tape is read in, Omnifax proceeds to process control words. It prints out on supervisory control printer each control word and comes to breakpoints 5 and 6 before processing the word.

Finish

The last control word on a control tape should be either 999999999999 or an initial read. Otherwise the routine will continue to process the next words as control words (e.g. 000 000 000 000 as skips), indefinitely.

CHECK ORDER

Control Section

If a control word is used which has no meaning to Omnifax CHECK ORDER types out together with the faulty control word, and a type-in of a new control word is requested.

"X" Order (inacceptable control words)

(The "X" order is described on page 45).

1. If the new BBB is less than the former BBB in 000BBB000WW
2. If the BBB of BLK AND WD is greater than BBB of the control word, or
3. If SS + WW of SS0BBB0000WW is greater than 59 (spans two blocks),

then CHECK ORDER types out and a new BLK AND WD type-in is requested.

Library Edit

(The Library Edit is described on page 29).

If the Edit Routine can't find the requested routine on a library tape, CHECK ORDER OF ROUTINES types out and the machine stops.

Hit the start bar to type in a new control word.

If the routine not found was the first routine of a group of routines to be edited, then the tape has been searched and rewound.

If the routine not found was the last routine of a group of routines then the tape has been edited up to the ZZZZZZZZZZZ block and the input tape has been rewound.

Special Output Tape

Function

This tape receives all information which is not printed out on supervisory control typewriter. This is to save time on the machine if type-outs are not needed immediately.

Method

1. Results are written on tape in the same form as they would appear on the Supervisory control typewriter.
2. When each control word is finished, the last block is put out on tape with FINISHED and a printer stop at the end of the information, and spaces to complete the block.
3. The tape stays positioned after each output so that the next output can be put on the same tape.
4. The tape will have exactly as many groups of information, each followed by FINISHED as there were control words processed using output tape.
5. After the last output, the tape must be rewound separately.

Printer Instructions

1. Set on computer digit.
2. The instruction for setting the printer will type out, and the printer will stop on a printer stop. Carriage return the typewriter and allow the printer to continue.
3. At the conclusion of each set of data FINISHED will print out and the printer will stop.

Section 3. Control Words: Detailed Description

"00" Order	Skip Control Word	000000000000

The "00" order is disregarded and the next control word is called for.

"99" Order	Stop Routine	999999999999

The "99" order will stop the machine. Hitting the start bar will call for a new control word.

Note: If a control tape is used either 999999999999 or an initial read order should be typed in after the last control word. Otherwise the routine will continue to process the next words as control words (e. g. 000000000000 as skips), indefinitely.

General Description

The Analyzer processes blocks of coding searching for cross references. Both the coding and references are then put out in edited form such that for each word of data the following are listed: line number, left-hand instruction, right-hand instruction, and all references to the line number. References to lines outside the memory span of the incoming coding (e.g. temporary storage) are also included.

The output is prepared in a page format with heading, date and page number at the top of each page. More than one set of coding may be analyzed in one run.

The routine consists of three parts:

1. Analysis
   Control information (either from type-ins or control tape) is written on tape, (T3). The subject tape, (T5), is processed line by line. The partially edited instructions are written on tape, (T3). Each block of sorted references are written on tape, (T4).
2. Sort
   The references are completely sorted and written on (T2). If the number of references in any routine exceeds 779, the extra references are sorted and written on (T6). The total number of references must not exceed 1559.
3. Edit
   The instruction lines (T3) are merged with the references (T2, T6) and edited for printing on (T4).

Method of Operation

Servo Layout

The routine uses 5 servos normally:

a.	Any servo	Omnifax tape
b.	Servo 2	Blank
c.	Servo 3	Blank
d.	Servo 4	Blank (Final Output)
e.	Servo 5	Input tape

If any of the routines processed contains more than 779 references:

f.	Servo 6	Blank.

The control tape can be mounted on any servo.

Control

Information for controlling the analyzer may be either typed in at the supervisory control or prepared on a control tape. The control information (including the date and heading) cannot exceed 60 words.

Manual Option

1.	Print-out	CONTROL WORD	
	Type-in	[ ]	control word as described below.
2.	Print-out	TYPE DATE	
	Type-in	[ ]	any 12 digits. This information will appear at the top of each page on the entire output.
3.	Print-out	TYPE HEADING	
	Type-in	[ ]	any 12 digits. This information will appear at the top of each page of the current routine.

4. Print-out CONTROL WORD

Type-in [ ] next control word.

NOTE: AXZ 000 000 000 - The analyzer waits until all analyzer control words have been typed, then AXZ 000 000 000 must be typed in as the last control word in order for the routine to start analyzing.

Description of control word AXCLLLSSSBBB

Digits

D_1-D_2	AX	Analyzer is to be used.
D_3	0	If blocks (BBB) are to have same heading as before.
	H	If blocks (BBB) are on the same tape, but start a new routine. A new heading is called for.
	R	If blocks (BBB) are on another tape and a new routine is to be started. A new heading is called for. The input tape will rewind with interlock before this routine is analyzed. Mount the new tape.
	Z	This is the ending sentinel.
D_4-D_6	LLL	The line number of the first line in the current group to be processed.
D_7-D_9	SSS	The number of blocks to skip (if any) before starting analysis.
D_{10}-D_{12}	BBB	The number of blocks containing consecutive addresses to be processed.

Tape Option

If a number of routines are to be analyzed, the type-ins may be Unityped in advance in the same order as indicated under "Manual Option."

Rerun

Provisions have been made to rerun any part using instructions currently in the memory or to read in the instructions for a given part from the Omnifax tape.

Rerun Part 1

A. If an error occurs before the completion of the type-ins clear C. Type in AXA 000 000 000 in order to reset the input control word counter.

B. If an error occurs during part 1, after the type-ins have been completed and before END PART 1 is printed, clear C.

C. If it is necessary to bring the Analyzer routine back from the service tape because of power failure, and if the control words have been written on tape 3, type in AX1 000 000 000.

Rerun Part 2

A. If an error occurs during part 2 which does not involve tape 4, clear C.

B. If it is desired to read the instructions for Part 2 into the computer again, initial read the Omnifax tape and type in AX2 000 000 000 in response to CONTROL WORD.

C. If tape 4 cannot be read, a complete rerun is necessary. It is not necessary to retype the control information. Initial read the Omnifax tape and type in AX1 000 000 000 in response to CONTROL WORD.

Rerun Part 3

A. If an error occurs during part 3 which does not involve the readability of tapes 2, 3 or 6, clear C.

B. If it is desired to read instructions for part 3 again from the service tape, initial read the Omnifax tape and type in AX3 000 000 000 in response to CONTROL WORD.

C. If tapes 2, 3 or 6, cannot be read it is necessary to restart Part 1. Initial read the Omnifax tape and type in AX1 000 000 000 in response to CONTROL WORD.

NOTE: Do not try to rerun part 2 after starting part 3. Information on tape 4 has been destroyed.

NOTE: Rewind tape 6 if used when rerunning part 2 and 3.

Print-Outs during the Running of Analyzer

Part 1

Normal Print-outs

a) All control words

b) First word of blocks being analyzed for each new control word

c) END PART 1

Special Print-outs

a) TOO MANY REF - Types out if any routine has more than 1559 references. The machine will stop.
Hitting the start bar resets the routine and another CONTROL WORD is called for. The routine must be broken up into two routines to remedy the situation.

b) TOO MANY CTRL WDS - Types out if the number of control words for the Analyzer part of Omnifax exceeds 60 (including date and headings). RESTART types out and a new control word is requested.

c) NO SUCH CTRL WD - types out if a wrong Analyzer control word (AX) is typed in. RESTART types out and a new control word is requested.

Part 2

Normal print-out

END PART 2

Special print-out

ZZ MOUNT T6 - types out if the number of references in any routine exceeds 774. The extra references are written on (T6).

Part 3

Normal print-out

END PART 3

OUTPUT ON T4

Types out number of blocks on output tape.

Printer Set-up

Single space, normal
Margin 18
tab 1 6 past margin
tab 2 8 past tab 1
tab 3 10 past tab 2

Special Notes

1. Alphabetic memory addresses are not given as references.
2. Y, Z and tape instructions are given as references only to word zero of the channel specified.

3. V, W instructions refer to both lines involved.
4. Q, T, and U instructions as left hand instructions are listed as references to the right hand location.
5. References are listed for the following additional instructions:

   70 (m) Supervisory control print-out (non-suppressible)

   I (m) rL $\rightarrow$m

   Servo (Δ) is listed as XX in reference column.
6. If digits 2 or 3 or both, of any half word is a typewriter symbol then both digits 2 and 3 are listed as XX in the reference column.

Example

AXH 100 005 00[illegible]
Calls for date and heading.
Calls for next CONTROL WORD.
AXO 320 000 010
Calls for next control word.
AXZ 000 000 000 (ending sentinel)
The Analyzer then

1. Skips 5 blocks on tape 5.
2. Analyzes 2 blocks of tape 5 numbering the lines starting from 100.
3. Analyzes 10 blocks of tape 5 numbering the lines starting from 320.
4. Finishes the analysis, types out OUTPUT ON T4 and types out the number of blocks on the output tape. Rewinds all tapes and calls for a new control word.

"B" and "F" Orders Skip Blocks BSSSSSSSBBBB
F

General Description

The "B" order will skip backward a specified number (BBBB) of blocks on a tape or group of tapes. Each S of SSSSSSS specifies a particular tape..

The "F" order will skip forward a specified number of blocks on a tape or group of tapes.

Example

F0350400000002

1. Two blocks are to be skipped forward on tape 3.
2. Then two blocks are to be skipped forward on tape 5.
3. Then two blocks are to be skipped forward on tape 4.

Similarly for a "B" order except in a backward direction.

General Description

The "C" order compares (BBBB) blocks of two tapes S and S' in a forward direction, while the "D" order compares two tapes in a backward direction. The discrepancies are put out on supervisory control typewriter or on special output tape, U.

Digit 5 of the control word determines whether tape 5 is rewound (6), rewound with interlock (8) or left positioned (0). Digit 6 determines rewinds for tape S'.

Method of Operation

Supervisory Control Typewriter

"SET SC 3 WDS" types out and the machine stops when the first discrepancies are located.

Set the supervisory control typewriter for computer digit, three words (39 digits).

Hit the start bar to allow the machine to continue typing out discrepancies and their locations (block and word).

Special Output Tape

The discrepancies are put on special output tape exactly as they would appear on the supervisory control typewriter.

The uniprinter must be set on computer digit for three words.

Completion

After the comparison is completed END CHECK types out.

If rewinds are called for, the appropriate tapes rewind, and a new control word is requested.

Examples

C76080000500

1. 500 blocks on tapes 6 and 7 are to be compared word by word in a forward direction.
2. Any differences will be printed on the supervisory control typewriter in ascending order.
3. Tape 7 will be rewound with interlock. Tape 6 will remain positioned after the 500 blks.

D46506000020

1. 20 blocks on tape 4 and 6 will be compared word by word in a backward direction.
2 Discrepancies will be put on a special output tape 5 in descending block order and ascending word order.
3. Tape 6 will be rewound. Tape 4 will be repositioned to its position before the backward comparison was started.

General Description

The codedit takes blocks of instructions or data from tape and edits them into a format similar to that in which the coding was orginally written. In order to preserve printer time the edited result is ignore-squeezed before being placed on the output tape.

Each page of printed output contains a heading, a date, and a page number. Each line is identified by a number. The twelve-digit words of Univac code are separated into halves and unnecessary zeros are replaced by spaces.

Method of Operation

A sequence of type-ins or words on the control tape provide the codedit with the page headings, and control information.

After the first edit word (EXO---------), the routine will call for date, and heading, and start editing the requested information.

The other digits of the control word have the following effects

D4.

0 No new heading, but new starting line number LLL for next BBB blocks of coding to be edited.

H New heading and new starting line number.

F Go forward (without editing, the next BBB blocks on tape S.

Z Put FINISHED and a printer stop into the next word

position of the output block, dump this last block onto tape T, rewind tapes listed in D_7 - D_9.

D5 S Input servo

D6 T Output servo

D7 - 9 LLL Starting line number for next blocks of coding to be edited.
If LLL = ΔΔ0 the line counter cycles continuously from 0 to 9.
If LLL = Δ00 the line counter cycles continuously from 00 to 99.

D10 - 12 BBB Number of blocks to be edited.

Breakpoints

Breakpoint 2 (60 lines per page)
This breakpoint occurs once after the first control word type-in. Force transfer for 60 lines per page output. (Otherwise material is edited at 30 lines per page). Breakpoint 2 is met only once and is not used again until the edit is completed with an "EXZ" order.

Breakpoint 4 (Removes pages of zeros)
This breakpoint occurs after each control word type-in. Force transfer to remove pages of zeros.
The page counter is kept as if zeros were still in, so the output will have appropriate gaps in the page numbering.

Breakpoint 5 (Control word change) (See breakpoint section page 7)

Breakpoint 6 (New location on control tape) (See breakpoint section page 7)

Breakpoint 0 (Previous location on control tape) (See breakpoint section page 7)

Printer set-up

Set printer on normal, (narrow paper).
Margin 10
Tab 1 7 past margin
Tab 2 11 past tab 1
Tab 3 20 past tab 2
Tab 4 18 past tab 3

Examples

EX0H53△△0010

1. Edit 10 blocks of information from tape 5 onto tape 3.
2. Routine calls for date and heading.
3. The lines of coding are numbered cycling from 0 - 9.
4. Routine calls for new control word when it has finished editing.

EX0053120002

1. Edit two blocks from tape 5 to tape 3.
2. Start numbering the lines of coding from 120.
3. After editing new control word is requested.

EX0F50000020

1. Go forward 20 blocks on tape 5.

2. Call for new control word.

EX0Z0350000

1. Put FINISHED and a printer stop into next word position and dump the last block on tape 3.
2. Rewind tapes 5 and 3.

NOTE: The number of blocks on the output tape and the number of pages edited, will type out on supervisory control typewriter.

General Description

The codedit for library tapes takes subroutines and edits them into a format similar to that in which the coding was originally written. It is assumed that each new subroutine starts at line 000. The number of lines to be edited in each subroutine is specified in the label line. If any of the digit 7, 8, and 9 of the label line is not 0, mod 1 keys are expected and everything is edited until a half word of "Z's" is found. The irrelevant information following the end of a subroutine in a block is not edited.

Method of Operation

A sequence of type-ins or words on a control tape provides the edit with the page headings and control information.

After the first edit control word (EXL---------), the routine will call for the date and heading and start editing the required information.

The other digits of the control word have the following effect:

D4

H Edit - New heading
O Edit - Keep same heading.
Z - Put FINISHED into next word position and dump the final block onto tape T, Rewind the tapes listed in D7 - D9.

D5	S	Input servo
D6	T	Output servo
D7 - 8	00	Not used
D9 - 10	AA	First two letters of label line of starting sub-routine to be edited.
D11 - 12	XX	First two letters of label line of last sub-routine to be edited.

Note: If -ZZZ is put in digits D9 - D12 of the control word the whole library tape from the first (-ZZZZZZZZZZ/) sentinel block to the final (ZZZZZZZZZZ/) sentinel block will be edited.

Breakpoints (See breakpoint section page 7.)

Breakpoint 2 (60 lines per page)
Breakpoint 5 (Control word change)
Breakpoint 6 (New location on control tape)
Breakpoint 0 (Previous location on control tape)

Printer set-up

Set printer on normal, (narrow paper)
Margin 10
Tab 1 7 past margin
Tab 2 11 past tab 1
Tab 3 20 past tab 2
Tab 4 18 past tab 3

CHECK ORDER OF ROUTINES

CHECK ORDER OF ROUTINES types out when the subroutine, whose first two digits (AA or XX) is specified in the control word, is not found.

If the first routine (AA) is not found, the input tape is rewound after the type out; no editing is performed.

If the last routine (XX) is not found the input tape is edited until the (ZZZZZZZZZZZZ) last sentinel and then rewound.

Examples

EXLH4600PIAB

1. Routine calls for the date and heading.
2. All subroutines on tape 4 starting with subroutine PI and ending with subroutine AB will be edited onto tape 6.
3. Each subroutine will start a new page.
4. Each subroutine will have its starting line numbered at 000.
5. The edit of each subroutine will have only the number of lines specified in the label line unless mod 1 keys are used.

EXL05600CICI

Edit routine CI from tape 5 onto tape 6.

NOTE: The number of blocks on the output tape and the number of pages edited, will type out on supervisory control typewriter.

General Description

The N.Y.U. compiler will be revised to fit into the Omnifax scheme. This new compiler will be able to put out on tape information to be edited. The parallel edit will take this information and edit it so that the relative addresses and coding will be side by side with the absolute addresses and coding. This will give the programmer a good picture of what was put into the compiler and what was the result of the compilation.

Method of Operation

A sequence of type-ins or words on the control tape provide the codedit with the page headings, and control information.
After the first edit control word (EXP---), the routine will call for the date, and heading, and start editing the requested information.
The compiler puts a sentinel at the end of the information so that a block limit is not needed.
The digits of the control word have the following effect:

D1 - D3	EXP	Parallel codedit
D4	O	Edit the information up to the sentinel
	H	Type new heading then edit the information up to the sentinel
	Z	Put FINISHED and a printer stop into the next word position of the output block and dump this last block onto tape T. Rewind

		tapes listed in D7 - D9. Number of blocks and total number of pages edited will type out on supervisory control.
D5	S	Input tape
D6	T	Output tape
D7 - D12	000000	Not used

Breakpoints

Breakpoint 2 (60 lines per page)

Occurs once after first control word type-in. Force transfer for 60 lines per page output. (Otherwise material is edited to give 30 lines per page).

Breakpoint 2 is not used again until the edit has been completed with a Z order.

Printer Set-Up

Printer set on normal
Margin 10
Tab 1 7 past margin
Tab 2 11 past tab 1
Tab 3 20 past tab 2
Tab 4 18 past tab 3

Example

EXPH52000000

1. Edit tape 5 onto tape 2. (Tape 5 must be a special tape made up by the compiler).
2. First the routine calls for the date, then the heading.
3. After editing the material, a new control word will be called for,

1. Put FINISHED and a printer stop into the next word position in the output block and dump it on tape 2.
2. Rewind tapes 5 and 3.
3. Number of blocks and total number of pages edited will type out on supervisory control.

General Description

An "I" order clears the memory, then initial reads block BBB of tape S into the block starting at, line LLL (Mod 10) and transfers control to line LLL.

Method of Operation

After the "I" order control word has been typed in, the machine will stop. (This enables the programmer to depress any breakpoint if desired.) Hit the start bar to clear the memory and initial read the indicated block on the tape into the specified memory location (Mod 10) and transfer control there.

Example

I502050001OO

1. The machine will stop to allow for breakpoints to be depressed. Hit the start bar.
2. Memory will be cleared and the 100th block of tape 5 will be read into 200-259.
3. Control will be transferred to location 205.

"IX" Order | Ignore Squeeze | IXSTOSSSBBBB

General Description

The Ignore Squeeze routine removes the non-productive character "ignore" from a tape of edited output intended for the uniprinter. As ignores are removed other characters are shifted forward to fill the vacant spaces.

Method of Operation

1. Mount input tape and a blank (or blanks) on any servos.

2. Set supervisory control typewriter on "normal".

3. When the routine types out CONTROL WORD, type in a control word of the following form

D1 - D2	"IX"	Ignore squeeze routine
D3	S	Input tape
D4	T	Output tape
D5	0	Not used
D6 - 8	SSS	Number of blocks to be skipped before starting to ignore squeeze
D9 - D12	BBBB	Number of blocks to be squeezed.

4. The output tape automatically rewinds when it has received 400 blocks and the routine asks for the next output servo number. The type-out is NEXT OUTPUT. Type in the new servo number twelve times.

5. If the input tape contains a block whose first word is the sentinel ENDALLOUTPUT, and the routine reaches this block, or if the routine reaches the

typed-in block limit, the routine is finished. The tapes involved will rewind and the number of input blocks processed and output blocks produced will be typed out.

6. If the sentinel is missing, and the tape does not have the specified number of blocks on it, then the tape must eventually run away or produce a bad read. When it has been determined that there can be no more input,
   (a) Depress breakpoint 1
   (b) Skip the "30" order on supervisory control.
   (c) The machine will reach a Q (1) order.
   (d) Force transfer to finish routine.

7. To rerun clear C. A new control word is called for. The tapes involved will rewind automatically after the control word is typed in.

Breakpoints

Breakpoint 1 (End Squeeze) (See 6 above).

Example

IX4300220100

1. Skip 22 blocks on tape 4.
2. Copy 100 blocks from tape 4 onto tape 3 at 20 pulses per inch removing ignores.
3. As the ignores are removed other characters are shifted forward to fill the vacated spaces.
4. If a sentinel ENDALLOUTPUT is reached before the 100 blocks are squeezed finish at this point.

General Description

The "L" order prints out on supervisory control typewriter or special output tape (U), the contents of specified memory locations on a tape (S).

Method of Operation

1. BLK AND WD is called for
   a. If single type-out wanted (type-in = 000BBB0000WW)
      BBB = Block (counted from tape location at the start of L order).
      WW = Word to be typed out.
   b. If type-outs of successive words in one block wanted.
      (type-in = SS0BBB0000WW)
      BBB = Block
      WW = First word.
      SS = Number of words in succession.

NOTE: Blocks need not be requested in any particular order (ascending or descending), (i.e. the routine can type out of locations in block 5 then in block 3 and then in block 4).

2. Completion
   Type in ZZZZZZZZZZZ (in response to BLK AND WD).

3. Rewinds
   Tape (S) is rewound (6), rewound with interlock (8), or left positioned (0) according to digit five of the control word.

Example

L85080000000

1. BLK AND WD will be called for. Type in (05001000004O).
2. The contents of tape 8, block 10, words 40 - 44 will print out on special output tape 5.
3. New BLK AND WD is called for.
4. ZZZZZZZZZZZZ typed-in in response to BLK AND WD finishes the routine rewinding tape 8 with interlock.

General Description

The "P" order compares (BBBB) blocks on two tapes (S) and (S'), typing out discrepancies and producing a third tape (T) which is a synthesis of tapes (S) and (S'). Tape (T) is written at either 20 pulses / in. or 128 pulses / in. depending on whether the seventh control digit is a (7) or a (0) respectively. When a discrepancy occurs, the programmer can choose which of the differing words is desired on the new tape, or he can type in still a different word. After the proofread is finished a (6) or (8) in the fifth digit position rewinds tapes (S) and (S') and a (6) or (8) in the sixth digit position rewinds tape (T).

Method of Operation

Depress breakpoints corresponding to the numbers of the two input servos.
If there are any differences they will be typed out and the routine will stop at the first breakpoint.
Force transfer to select the word from the first tape.
Hit start bar to reach second breakpoint.
Force transfer to select the word from the second tape.
If neither word is desired hit the start bar and type in the correct word.

Breakpoints (See above, Method of Operation)

Supervisory Control Typewriter

When the first discrepancy is found, the machine will

print out SET SC FOUR WDS and stop.
Set typewriter for computer digit four words (52 digits)
Hit start bar to continue.

Example

P3246070005 4

1. 54 blocks on tapes 2 and 3 to be compared.
2. 54 corrected blocks to be written on tape 4 at 20 pulses / in.
3. Tapes 2 and 3 to be rewound without interlock leaving tape 4 positioned.

General Description

The "S" order prints out, on S. C. typewriter or special output tape (U), the contents of any location (WW) in each of the (BBBB) blocks of tape (S), or the contents of a group of (N) locations starting with word (WW) in each of the (BBBB) blocks of tape (S). If identifying block numbers are to be typed out, a (B) must be typed into the third digit position of the control word. Tape (S) rewinds if digit five is a (6) or (8), and remains positioned if it is a (0).

Method of Operation

SET SC TYPE will type out and the machine will stop. Set the supervisory control typewriter on computer digit for the number of words in a group (N), adding one more word if the block number type-out (B) is also expected. Hit the start bar to start the type-outs of the sampler.

Special Output Tape

The sampled words are put on a special output tape the same way they would appear if they had been typed out on the supervisory control typewriter. Set printer on computer digit for the number of words in a group, adding one more word if the block number type-out is also expected.

Example

S3B463140500

1. 500 blocks on tape 3 are to be sampled.
2. The 14th 15th and 16th word in each block (1500 words) with block indentification. (i.e. BLOCK 0001X000000000000X111111111111 X2222222222222X)
   BLOCK 0002X ---------- etc.)
   are to be placed on special output tape 4.
3. Set uniprinter for 4 words computer digit when tape 4 is printed.
4. Rewind tape 3 when sample is finished.

General Description

The "W" order is designed to locate on a tape (S) a known word whose location is unknown. (BBBB) blocks of tape are searched, and all locations containing this identical word are printed out on the S. C. typewriter or on a special output tape (U). Tape S is rewound after the search if the fifth digit position is a (6) or an (8).

Method of Operation

A type-out, TYPE WORD, follows the control word.
Type in the word to be looked for.
The tape will be searched and the routine will type out all the blocks and words containing this identical word.

Example

W70060000005

1. TYPE WORD will type out.
2. Type in word to be looked for.
3. 5 blocks of tape 7 will be searched and all blocks and words containing this identical word will type out on the S. C. typewriter.
4. Tape 7 will rewind.

General Description

The "X" order copies (BBBB) blocks from tape (S) onto tape (T), at 20 pulses / in. (7) or 128 pulses / in. (0) allowing for corrections. When the copying is completed there are four options, determined by the eighth control digit, that the routine can take:

(0) - Tape (S) and (T) are compared in a backward direction.

(F) - Tape (S) and (T) are compared in a forward direction.

(Discrepancies are printed out on S. C. typewriter or tape [U]).

(R) - Tape (S) and (T) are read backward (BBBB) blocks

(N) - Tapes (S) and (T) are positioned.

Then tape (S) will be rewound (6) or (8) or repositioned (0) as specified by digit 5. Digit 6 determines the rewinds for tape (T).

Method of Operation

1. BLK AND WD is called for.
   a. Each correction: (000BBB0000WW)
      BBB = Block
      WW = Word to be corrected
   b. Corrections of successive words in one block:
      (SS0BBB0000WW)
      BBB = Block
      WW = First word
      SS = Number of words in sequence

NOTE: Either 01 or 00 in SS digit position indicates that location WW is the only one to be corrected.

c. Corrections in the same block: (SS000000000WW) (i.e. BBB does not need to be repeated).

2. Corrections

a. Contents of WW types out.

b. Type in correction (or successive corrections).

c. Next BLK AND WD is requested.

3. Completion

Type in ZZZZZZZZZZZZ in response to BLK AND WD.

4. Comparison (digit 8)

If a zero is typed into digit 8 in the control word, the two tapes (input and output) will be compared backward. If an F is typed into digit 8 in the control word the two tapes (input and output) will be compared forward.
(See comparison orders "C" and "D", page 23).
An R in digit 8 of the control word will read the input and output tape backward. An N in digit 8 will leave the tapes positioned.

5. Rewinds (digits 5 and 6)

Input and output tapes are rewound or repositioned and a new control word is called for.

CHECK ORDER

Types out if:

1. New BBB less than former BBB in 000BBB0000WW

2. BBB of BLK AND WD greater than BBB of control word.
3. SS + WW of SSOBBBOOOOWW greater than 59. (spans two blocks)

A new type-in of BLOCK AND WORD is requested.

Breakpoints

Breakpoint 7 (Instructions of corrections while using a control tape after CHECK ORDER has typed out)

A. Depress breakpoint 7 after CHECK ORDER type-out.
B. Type in first correct order.
C. Force transfer for inserting further words.
D. The routine will keep coming back for more insertions to be typed in on supervisory control panel.
E. Type in ENDINSERTION to return to place on control tape.

NOTE: If ZZZZZZZZZZZ is typed in to end the "X" order, no more insertions are requested. Control returns to tape at the word following the one that caused CHECK ORDER.

Breakpoint 6 (New location on control tape)

Breakpoint 5 (Change control word)

Breakpoint "0" (Previous locations on control tape)

See section on Breakpoints, page 7.

Example

X456807F0124

1. 124 blocks to be copied from tape 4 to 5 making corrections in accordance with the correction list which follows the control word.
2. 080016000051 typed in as a BLK AND WD will cause a type out of the contents of block 16 word 51. Type-ins will be requested until all eight locations (block 16, words 51 - 58) have been corrected.
3. BLK AND WD will be requested again until the word ZZZZZZZZZZZZ is typed in to end the corrections.
4. Tape 5 will be written on at 20 pulses / in.
5. Tapes 4 and 5 will be compared in a forward direction. Each discrepancy is recorded as three words on special output tape 6, (word on tape 4, block and word location, word on tape 5).
6. Tape 4 to be rewound with interlock; tape 5 to remain positioned.

"Z" Order — Copy without Corrections — ZST06600BBBB
F
N
R

General Description

The "Z" order copies BBBB blocks of tape S onto tape T. (See description of "X" order for the rest of the digit breakdown).

Method of Operation

Comparison (digit 8)

If requested the machine will compare or read the input and output tapes. This is done to make sure the tapes will read and the machine is writing correctly. (See description under "X" order.)

Rewinds or repositions (Digits 5 and 6)

According to the control word the input and output tapes are rewound or repositioned.

Example

Z4-066000012

1. 12 blocks to be copied from tape 4 to tape - at 128 pulses / in.
2. Both tapes to be compared in a backward direction.
3. Both tapes to be rewound without interlock.

Control word = 999 9 Control word = 000 0	
	D
Backward Skip	B
Forward Comparison	C
Backward Comparison	D
Forward Skip	F
Initial Read	I
Line Search	L
Proofread	P
Rewind	R
Sampler	S
Word Search	W
Copy with corrections	X
Copy without corrections	Z

Control word = 999 999 999 999 = end tape control
Control word = 000 000 000 000 = skips

NYU OMNIFAX

	Control words								Blocks			
	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9	D_{10}	D_{11}	D_{12}
Backward Skip	B	S Any Servos	S	S	S	S	S	S	B	B	B	B
Forward Comparison	C	S Input Servo Number	S' Second Input Servo	U Results on Servo U O On SC type.	6 Rewind Servo S with 6 or 8 8 O No rewind	6 Rewind Servo S' with 6 or 8 8 O No rewind	O	O	B	B	B	B
Backward Comparison	D	S "	S' "	U O "	6 8 " O	6 8 " O	O	O	B	B	B	B
Forward Skip	F	S Any Servos	S	S	S	S	S	S	B	B	B	B
Initial Reod	I	S Input Servo Number	O	Location for first block			O	O	B	B	B	B
Line Search	L	S "	U Results on Servo U O On SC type.	O	6 Rewind 8 S O	O	O	O	O	O	O	O
Proofread	P	S "	S' Second Input Servo	T Output Servo	6 Rewind both 8 S and S' O No rewind	6 Rewind 8 Servo T O No rewind	O Output 100/inch 7 Output 20/inch	O	B	B	B	B
Rewind	R	S Any Servos	S	S	S	S	S	S	S	S	S	S
Sampler	S	S Input Servo Number	B Block Number Typed O Not	U Results on Servo U O On SC type.	6 Rewind 8 S O	N Number of successive words to be sampled	First word to be sampled		B	B	B	B
							W_1	W_2				
Word Search	W	S "	U Results on Servo U O On SC type.	O	6 8 " O	O	O	O	B	B	B	B
Copy with corrections	X	S "	T Output Servo Number	U Results on Servo U O On SC type.	6 Rewind Servo S with 6 or 8 8 O No rewind	6 Rewind Servo T with 6 or 8 8 O No rewind	O Output 100/inch 7 Output 200/Inch	O Comparison O Backward F Forward N None R Read back	B	B	B	B
Copy without corrections	Z	S "	T "	U O "	6 8 " O	6 8 " O	O 7 "	O F N R "	B	B	B	B

	D_1	D_2
Analyzer	A	X
Ignore squeeze	I	X
Edit	E	X

	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9	D_{10}	D_{11}	D_{12}
Analyzer	A	X	O Chonge LLL H New heading New routine Same tape R New heading New routine New tape	Starting line number L	L	L	Number of blocks to skip S	S	S	B	B	B
			Z Ending Sentinel	O	O	O	O	O	O	O	O	O
Ignore squeeze	I	X	S Input Servo	T Output Servo	O	Number of blocks to skip S	S	S	B	B	B	B
Edit	E	X	O Regular	O Change LLL H New Heading	S Input Servo	T Output Servo	Starting line number L	L	L	B	B	B
				F Skip Forward	S Input Servo	O	O	O	O	B	B	B
				Z End Routine	O	T Output Servo	Servos to be rewound S	S	S	S	S	S
			L Library	O Same Heading H New Heading	S Input Servo	T Output Servo	O	O	1st two letters of starting subroutine A	A	1st two letters of final subroutine X	X
				Z End Routine	O	T Output Servo	Servos to be rewound S	S	S	S	S	S
			P Parallel	O Same Heading H New Heading	S Input Servo	T Output Servo	O	O	O	O	O	O
				Z End Routine	O	T Output Servo	Servos to be rewound S	S	S	S	S	S

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